

## Message Text

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R 191944Z OCT 76  
FM SECSTATE WASHDC  
TO USMISSION IAEA VIENNA

UNCLAS STATE 258588

FOLLOWING OECD PARIS 30623 SENT ACTION SECSTATE OCT. 15;  
REPEATED TO YOU QUOTE

UNCLAS OECD PARIS 30623

PASS : OES FOR KRATZER/PROCHNIK  
ERDA FOR SIEVERING/VANDERRYN  
NRC FOR GOSSIK

E.O. 11652: N/A

TAGS: TECH, OECD, ENRG  
SUBJECT: PROPOSED WORK PROGRAM FOR THE IEA NUCLEAR  
SUB-GROUP OF THE SLT.

1. BEGINNING SUMMARY : FORWARDED BELOW IS A MISSION  
PROPOSAL CONCERNING THE IEA NUCLEAR SUB-GROUP WORK  
PROGRAM. PROPOSAL RECOMMENDS ESTABLISHMENT OF A  
WORKING GROUP TO STUDY PRINCIPAL MATERIAL PROBLEMS  
ASSOCIATED WITH CURRENT AND PROPOSED NUCLEAR POWER  
PRODUCTION AND STEPS BEING TAKEN TO DEAL WITH SUCH  
PROBLEMS, NATIONALLY AND INTERNATIONALLY. SUCH ACTION  
COULD RESULT IN RECOMMENDATIONS FOR IMPROVED COORDINA-  
TION OF EXISTING DEVELOPMENT PROGRAMS, OR FOR CREATION OF  
ADDITIONAL MATERIALS R&D PROJECTS TO EXTEND REACTOR COM-  
PONENT LIFETIMES. END OF SUMMARY.

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2. WORK PROGRAM PROPOSAL IS PUT FORWARD NOW IN DETAIL TO OFFER OPPORTUNITY FOR CONSIDERATION BY SUB-GROUP AT INAUGURAL MEETING, CURRENTLY SCHEDULED FOR OCT. 25-26. MISSION BELIEVES THAT CONSIDERATION OF ADDITIONAL ISSUES BESIDES FOUR ALREADY ON ANNOTATED AGENDA MAY BE HELPFUL IN EARLY STAGE OF GROUP'S ACTIVITIES.

3. PROPOSAL DEALS WITH MATERIALS PROBLEMS ASSOCIATED WITH CURRENT AND PROPOSED NUCLEAR POWER PRODUCTION AND STEPS WHICH COULD BE TAKEN TO DEAL WITH THEM. RELATIONSHIP OF THIS ISSUE TO MANDATE OF NUCLEAR SUB-GROUP IS POTENTIAL FOR INCREASING POWER PLANT ON-LINE FACTORS THEREBY EXTENDING ELECTRICAL POWER SUPPLIES IN TIMES OF EMERGENCIES OR OTHERWISE. PROPOSAL MAY BE SEEN AS EXTENSION OF AGENDA ITEM 3 DEALING WITH EXTENDING CORE LIFETIMES. POSITIVE ACTION ON PROPOSED STUDY COULD RESULT IN TECHNICAL R&D PROJECT AND FOR THIS REASON IT IS SUGGESTED THAT CONTENT ALSO BE DISCUSSED WITH CERD, GENERAL AREA OF WORK PROPOSED HAS NOT PREVIOUSLY BEEN STUDIED BY NEA (EXCEPT IN VERY NARROW SENSE BY DRAGON AND HALDEN PROJECTS). PROGRAM WOULD APPEAR SUITABLE AS EITHER IEA OR NEA UNDERTAKING.

4. BACKGROUNDS : MATERIAL DEVELOPMENT AND APPLICATION ARE OFTEN NEGLECTED AREAS OF ENGINEERING DESIGN. USUAL INDUSTRIAL PRACTICE EMPLOYS TRADITIONAL MATERIALS AND CONCEPTS FOR DESIGN APPLICATIONS WHEN POSSIBLE. INDEED THIS PRACTICE IS CLEARLY DISCERNIBLE IN PRESENT DAY NUCLEAR STEAM SUPPLY SYSTEMS, WHERE EXISTING COMMERCIAL ALLOYS HAVE BEEN ADOPTED FOR MOST PRINCIPAL COMPONENTS. WHILE THE ADVENT AND WORLD-WIDE USE OF COMMERCIAL NUCLEAR POWER PLANTS WOULD HAVE BEEN EXPECTED TO RESULT IN DEVELOPMENT OF NEW, EVEN EXOTIC MATERIALS FOR THE MANY DIVERSE NUCLEAR APPLICATIONS, ONLY IN THE CASE OF ZIRCALOY FUEL PIN CLADDING HAS ANYTHING TRULY NEW BEEN DEVELOPED. THE CONTROLLING FACTOR, OF COURSE, HAS BEEN THE NEED TO COMPLY WITH THE ASME BOILER AND PRESSURE VESSEL CODE, OR SIMILAR STANDARDS. THESE REQUIREMENTS CALL FOR AN EXTENSIVE BODY OF DATA OR INDUSTRIAL EXPERIENCE ON STRUCTURAL ALLOYS AND WELDS, UNCLASSIFIED

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WHICH FOR MOST APPLICATIONS ARE TIME CONSUMING AND DIFFICULT TO ACCUMULATE. THEREFORE, FOR DESIGN OF STRUCTURAL COMPONENTS, PARTICULARLY THOSE USED FOR LONG PERIODS OF TIME AT ELEVATED TEMPERATURE AND LOADING CONDITIONS, THE EXPEDIENT AND OFTEN NECESSARY APPROACH HAS BEEN TO EMPLOY CONVENTIONAL STANDARD COMMERCIAL ALLOYS AND DESIGN TECHNIQUES. (ZIRCALOY IS UTILIZED FOR NON-STRUCTURAL APPLICATIONS IN THE REACTOR CORE AND COULD,

THEREFORE, BECOME AN EXCEPTION). WHAT HAS OCCURRED INSTEAD IN THE FIELD OF NUCLEAR MATERIALS DEVELOPMENT IS A SIGNIFICANT ADVANCEMENT IN MATERIAL SPECIFICATIONS. NARROWING SPECIFICATION RANGES AND CONTROLLING RATHER PRECISELY THE AMOUNTS AND RATIOS OF CERTAIN KEY CONSTITUENTS HAS LED TO ALLOYS WITH SUPERIOR AND MORE CONSISTENT CHARACTERISTICS AND OF HIGHER QUALITY THAN PREVIOUSLY AVAILABLE. CONSEQUENTLY, ONLY A HALF DOZEN OR SO ALLOYS HAVE BECOME BASIC TO STRUCTURAL COMPONENTS IN THE WORLD'S COMMERCIAL LWR'S. ONLY A FEW ADDITIONAL MATERIALS APPEAR WHEN HTR'S AND LMFBR'S ARE CONSIDERED. ALL ARE MODIFICATIONS OF WELL KNOWN ALLOYS.

5. EXISTING PROGRAMS : IN A SURVEY OF EUROPEAN WORK CONDUCTED ONE YEAR AGO BY THE CURRENT OECD SCIENCE ADVISOR FOR ENERGY, NO EXTENSIVE OR COORDINATED EFFORT WAS APPARENT TO DEVELOP NEW ALTERNATE MATERIALS TO DISPLACE THOSE CURRENTLY IN USE. GOVERNMENT AND INDUSTRIAL SPONSORSHIP OF MATERIALS R&D FOR CURRENT GENERATION REACTORS, EXCEPT FOR DATA GENERATION, WAS FOUND TO BE MINIMAL. AS IN THE U.S., METAL FABRICATORS, SUCH AS TUBE MILLS, INDIVIDUALLY SUPPORT DEVELOPMENT PROGRAMS BUT ON AN AD-HOC BASIS WITH NO SIGNIFICANT INPUT FROM DESIGNERS AND USERS. TRADITIONAL MATERIALS ARE, FOR THE MOST PART, CONSIDERED SATISFACTORY AND THEIR FUTURE USE MAY WELL BE AN HISTORICAL CERTAINTY. DETAILS OF ABOVE STUDY ARE AVAILABLE IN DOCUMENT ENTITLED "NUCLEAR MATERIAL SELECTION AND DEVELOPMENT IN EUROPE" PREPARED AT ERDA/BRUSSELS OFFICE, AUGUST 1975. APPROPRIATE OBSERVATIONS AND CONCLUSIONS ARE SUMMARIZED AS FOLLOWS: LWR MATERIALS DEVELOPMENT IS CONDUCTED MAINLY WITHIN INDUSTRY. UNNECESSARY DUPLICATION AND LACK OF COORDINATION IS APPARENT. EXTENSIVE GOVERNMENT FUNDING PROVIDED

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DES SUPPORT FOR MORE COORDINATED LMFBR MATERIAL PROGRAMS. A PRINCIPAL MATERIALS CONCERN IN LWR'S RESIDES WITHIN THE STEAM GENERATOR, WHERE MATERIALS-ASSOCIATED PROBLEMS CAN RESULT IN CONSIDERABLE POWER PLANT DOWN-TIME. LWR SYSTEM PIPING CORROSION AND WELD CRACKING ARE ALSO OF INTEREST. ON THE OTHER HAND, FUEL PIN CLADDING TECHNOLOGY IS CONSIDERED SATISFACTORY. FOR LMFBR'S, BOTH FUEL CLADDING AND STEAM GENERATOR MATERIALS BEHAVIOR ARE CONSIDERED PERFORMANCE LIMITING BUT SIGNIFICANT PROGRAMS TO DEVELOP NEW MATERIALS HAVE NOT BEEN UNDERTAKEN. CURRENT HTGR COOLANT TEMPERATURES DO NOT REQUIRE USE OF MATERIALS OTHER THAN THOSE CONSIDERED FOR PRESENT NUCLEAR INSTALLATIONS, BUT LONG-RANGE PLANS CALL FOR BROADENING MATERIALS BASE TO ALLOW FOR HIGHER TEMPERATURES REQUIRED FOR PROCESS HEAT OR DIRECT CYCLE

APPLICATIONS.

6. CONCLUSIONS : NUCLEAR MATERIALS DEVELOPMENT MAY WARRANT INCREASED INTERNATIONAL SUPPORT AND PROVIDE LONG-TERM BENEFITS IN INCREASED POWER PLANT PERFORMANCE AND RELIABILITY. GENERIC LWR MATERIAL PROBLEMS EXIST SUCH AS STRESS CORROSION CRACKING AND STEAM GENERATOR TUBE WASTAGE, FOR WHICH DEVELOPMENT AND CODE VERIFICATION OF NEW CORROSION RESISTANT ALLOYS WOULD BE BENEFICIAL. IN THEIR ABSENCE, INDUSTRY HAS BEEN FORCED TO PROCEED BY ENGINEERING AROUND PROBLEMS. THUS, COMPLICATED SYSTEMS PRECISELY CONTROLLING STEAM GENERATOR WATER CHEMISTRY AND SOPHISTICATED LEAK DETECTION AND INSPECTION DEVICES HAVE BEEN INTRODUCED AT SIGNIFICANT COST AND AT THE EXPENSE OF SYSTEMS AND OVERALL PLANT RELIABILITY. HOWEVER, THE LEAD TIME REQUIRED TO PROVIDE A FULLY SANCTIONED COMMERCIAL PRODUCT IS IN THE ORDER OF TEN YEARS AND THUS, THE BENEFITS FROM LWR MATERIALS DEVELOPMENT WILL NOT ACCRUE FOR LONG PERIOD OF TIME. IN ADDITION, ALTHOUGH COOPERATIVE ACTIVITIES COULD BE HIGHLY BENEFICIAL, PROPRIETARY CONCERNS MAKE EFFECTIVE COOPERATION UNLIKELY. CONSEQUENTLY, IT MAY BE MORE FRUITFUL TO FOCUS ATTENTION ON DEVELOPING TECHNOLOGIES SUCH AS THE LMFBR, HTR AND FUSION SYSTEMS. ADDITIONALLY, BECAUSE THESE ARE EVOLVING TECHNOLOGIES, THEY ARE BETTER SUITED TO EFFICIENTLY INCORPORATE NEW TECHNOLOGY.

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GICAL ADVANCES INTO THEIR SYSTEM DESIGNS.

7. POSSIBLE PROPOSAL TO NUCLEAR SUB-GROUP : CONVENE A GROUP OF EXPERTS TO EXAMINE PRINCIPAL MATERIALS PROBLEMS ASSOCIATED WITH CURRENT AND PROPOSED NUCLEAR POWER PRODUCTION AND STEPS BEING TAKEN TO DEAL WITH SUCH PROBLEMS, NATIONALLY AND INTERNATIONALLY. SUCH ACTION COULD RESULT IN RECOMMENDATIONS FOR IMPROVED COORDINATION OF EXISTING DEVELOPMENT PROGRAMS OR CREATION OF ADDITIONAL ALLOY DEVELOPMENT PROJECTS TO EXTEND REACTOR COMPONENT LIFETIMES. KATZ UNQUOTE ROBINSON

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## Message Attributes

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